orographic basin, resulting from the tilting of faulted beds. The question of outlet is discussed in detail, the conclusion being that the lake did not overflow.

Chapter III. discusses the physiography of the Lahontan basin, describing in detail the valleys and mountains, and its lakes, rivers, and springs, and including numerous analyses of the waters from these three sources. Attention is given to the peculiar playas or broad mud-plains of the arid region of the Far West, as well as to the temporary lakes, called 'playa-lakes,' which frequently flood them.

The physical history of the ancient lake is fully and ably discussed in Chapter IV. Under the head of 'Shore Phenomena' we find detailed descriptions and illustrations of the terraces, bars, embankments, etc., that were formed about its shores. The highest of the ancient water-lines is named the 'Lahontan Beach;' and the most conspicuous terraces below this are the 'lithoid,' 'dendritic,' and 'thinolitic.' Each of these marks the upper limit of a variety of tufa, from which it derives its name.

Numerous sections are introduced to show the structure and relations of the mechanical sediments, which consist of two deposits of lacustral marls, separated by a heavy layer of current-bedded gravels; thus recording two lake periods and an intermediate low-water stage.

Chapter V., on the chemical history of the lake, is especially important. It includes, first, a general account of the chemistry of natural waters as they occur in streams, springs, lakes, oceans, and enclosed lakes or seas, followed by descriptions of the tufas precipitated from the water of Lake Lahontan, the salts precipitated when complete evaporation took place, the efflorescences now forming on the desiccated floor of the lake, and the salt-works of the region. As already indicated, the tufas present three main divisions. The lithoid tufa is a compact, stony variety, and is the oldest of the principal calcareous deposits that sheathe the interior of the basin. Thinolitic tufa is composed of crystals, and was formed in the ancient lake when it was greatly reduced by evaporation. The dendritic tufa has a branching or dendritic structure, whence its name, and it is the newest of the tufa formations.

Chapter VI. presents the life-history of the ancient lake as determined by the abundant molluscan remains and other fossils that have been found. The shells show that the lake was fresh throughout its higher stages. During the period when thinolite was formed, it seems to have been too concentrated to admit of the existence of molluscan life, as no fossils have been found in that deposit. A chipped implement discovered in the upper lacustral beds indicates that man inhabited the Far West during the last rise of Lake Lahontan.

Chapter VII. is a brief *résumé* of the preceding chapters; while Chapter VIII. is devoted to a discussion of the quaternary climate of the Great Basin, the periods of greatest lake-expansion being correlated with the two glacial epochs of the Sierra Nevada, and believed to indicate cold and moderately humid periods.

In Chapter IX. we have a summary of the evidence bearing on the determination of the geological age of the lake. The conclusion reached is that it existed during the quaternary, but was more recent than the date usually assigned for the close of the glacial epoch.

The tenth and concluding chapter contains an account of the orographic movements that have affected the Lahontan basin since the last high-water period, including a map showing all the post-Lahontan faults, some of which are marked by exceedingly fresh escarpments, and are evidently still in process of formation.

The illustrations are profuse and admirably executed, and Mr. Russell's style is throughout clear and graphic. Details are mainly kept in the background, or presented in tabular form; and it is probable that both in general interest and educational value this monograph is excelled by none of the publications of the Geological Survey.

Elements of Geodesy. By J. H. GORE. New York, Wiley. 8°.

THE present publication is a treatise on some geodetic operations, and intended to give the beginner a clear insight into the subject. It begins with a brief historical sketch of the various attempts to determine the figure of the earth. The former half of the book is devoted to a description of the instruments and of the elementary operations and methods of plane geodesy, but the principal object of the author is to describe the methods of spheroidic and geoidic geodesy. The student who begins to study this important branch of geodesy will, or at least ought to, be conversant with the instruments applied by geodesists, with the theory of least squares, and with the calculation of triangulations, which are set forth at some length in the first part of the book. On the other hand, the beginner, who will find some valuable and practical hints in the chapters on base measurements and the field-work of triangulations, will miss a discussion of topographical methods and operations. The book would become far more useful for the beginner, who must study the simpler geodetic operations before beginning with the measurement of the figure of the earth, if a description of the methods and theories of topography were included in the plan. The development of each formula is very complete, and the results are given in the shape that the majority of writers have considered the best. Examples are given to illustrate the application of the formulæ. The student will find at the end of each chapter a list of books referring to the subject under discussion. F. B.

NOTES AND NEWS.

AS we go to press we have obtained a copy of the opening remarks of Prof. S. P. Langley, president of the American Association. Professor Langley spoke as follows:—

MEMBERS OF THE ASSOCIATION, — While, for the main purpose of our coming here, we are all of one mind, some must remember a peculiar pleasure in their first attendance, when they came to these meetings as solitary workers in some subject for which they had met at home only indifference, and held themselves alone in, till here, with a glad surprise, they met others, too, caring for what they cared for, and found among strangers a truer fellowship of spirit than their own familiar friends had afforded. With such communities of purpose wherever two or three among us are gathered together, it is a happy thing that we cannot remain strangers; for doubtless, of the many here who have habitually breathed "the calm and still air of delightful studies," there are few but know by experience how hard it is for one coal to keep alight alone, and how especially good it is for the solitary workers to be brought at times into the warmth of companionship. To a great many of us, then, it may be counted as the very chiefest good of such an assembly as ours to-day, that here each meets some one with a kindred glow, and finds that interest and sympathy from his co-worker without which the scientific life would be but too cold. It is most fortunate, nevertheless, that our happy constitution as a body, not only of investigators in science, but of teachers and lovers of knowledge, brings those here in greatest numbers who disseminate as well as produce it, and who are skilled to recognize the value of the newly mined product when brought into this public exchange of ideas. We must admit here, that foolish ideas as well as wise ones are brought to this open mart, and that, in dealing with the variety of papers now presented for acceptance, it becomes almost as hard a task for us to shut out folly as to entertain wisdom; for, after all, who are we that judge, and how can we say "wisdom is in us to decide," when it is chiefly because we are ignorant that we are here? Probably the only rule is that taught by experience, that since art is long and life short, experience difficult and judgment uncertain, knowledge commonly advances best by such little steps, that one foot is not lifted till the other is securely planted on the solid ground of fact. On the whole, then, while we agree that some rare visitors have come to us over the "high *priori* road," do not let us welcome without scrutiny all those who would walk over it into this association's domain. At the same time, in view of our ignorance as to the real nature and causes of things, I would plead with those of you who are judges, for a large tolerance, even of what seem to be errors of speculation, *when* these are found in company with evidence of a faithful original study of facts; for we shall then have, at any rate, done our best not to turn away Truth, even if she has come to us in an unfamiliar dress. And now I can only congratulate this assembly of her followers on a meeting which opens so auspiciously, and express the hope, that whether in the new knowledge which we may take to the section-room or find there, or in the